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Multiple Nanoscale Morphologies of Poly(Ethylene-*co*-Acrylic Acid) Ionomers CHRISTOPHER D. CHAN, Department of Chemical and Biomolecular Engineering, University of Pennsylvania, TRAVIS W. BAUGHMAN, Macromolecular and Organic Chemistry, Technical University of Eindhoven, KATHLEEN L. OPPER, KENNETH B. WAGENER, Department of Chemistry, University of Florida, KAREN I. WINEY, Department of Material Science and Engineering, University of Pennsylvania — We have synthesized linear poly(ethylene-co-acrylic acid) (EAA) copolymers with precisely placed acid groups using ADMET (acyclic diene metathesis). In the acid form, the EAA copolymers with precisely placed acid groups exhibit the typical orthorhombic PE crystal structure along with a new layered structure. The layered structures coexist with the PE crystals and have spacings consistent with the separation between acid groups; at 9.5mol% acid the layer-to-layer spacing is 2.53 nm. When these linear EAA copolymers are neutralized with zinc acetate in solution, high angle annular dark field scanning transmission electron microscopy (HAADF STEM) shows that the Zn-rich ionic aggregates decrease in size as the level of neutralization increases from 25% to 100%. X-ray scattering indicates that the cations decorate the acid-acid layered structure at low neutralization level, but eventually disrupt the layers at higher neutralization levels.

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